

**From:** Overbay, Michael  
**Sent:** Wednesday, December 18, 2013 7:51 AM  
**To:** Dellinger, Philip;R6 6WQ-SG;Dwyer, Stacey  
**Subject:** RE: EARTHQUAKES: Texas agency doubtful as it investigates link to drilling-waste injection

Last night PBS had a 2 hour special on how Arthur Conan Doyle, and his character Sherlock Holmes, really established the first scientific scrutiny of evidence in a fashion that is now known as forensic crime scene investigations. One of the most prominent principles is to not develop any theories on a subject until you have investigated the evidence, because early speculation biases the thought process. Seems some folks should consider that.

Michael Overbay, P.G.  
Regional Groundwater Center Coordinator  
US Environmental Protection Agency, Region 6  
(214)665-6482

---

**From:** Dellinger, Philip  
**Sent:** Wednesday, December 18, 2013 7:38 AM  
**To:** R6 6WQ-SG; Dwyer, Stacey  
**Subject:** FW: EARTHQUAKES: Texas agency doubtful as it investigates link to drilling-waste injection

---

**From:** Casso, Ruben  
**Sent:** Wednesday, December 18, 2013 7:31 AM  
**To:** Lawrence, Rob; Dellinger, Philip  
**Subject:** EARTHQUAKES: Texas agency doubtful as it investigates link to drilling-waste injection

## **EARTHQUAKES: Texas agency doubtful as it investigates link to drilling-waste injection**

Mike Soraghan, E&E reporter

Published: Wednesday, December 18, 2013

Local governments in north Texas have turned to state officials to investigate whether underground injection of drilling waste is causing small but persistent earthquakes near Dallas. But the agency that would lead the investigation has been reluctant to accept established science on the subject.

The Texas Railroad Commission, an oddly named agency that oversees oil and gas in the state, says on its website that "staff has not identified a significant correlation between faulting and injection practices." That exact statement has been given to news outlets by agency representatives since November, when quakes started rattling people around Azle, northwest of Fort Worth.

The statement is at odds with the scientific community, which identified a significant correlation between quakes and deep injection of industrial waste more than 40 years ago.

That has left at least one local official puzzled.

"I don't understand how the RRC can say 'staff has not identified a significant correlation between faulting and injection practices,' when it has been scientifically linked many times," Azle's mayor, Alan Brundrett, said in an email exchange. "I am not sure what they consider 'significant.' It seems to me that the RRC needs to get an outside opinion."

Commission spokeswoman Ramona Nye last week said the commission statement should be clarified to say the staff hasn't identified a "definitive" correlation between earthquakes and "injection in Texas." That would not contradict settled science, but it would contradict the scientific conclusions of several Texas researchers. The broader statement remains on the [agency website](#).

Another local official said he never expected much from the Railroad Commission, which he sees as aligned with industry. George Conley, a Parker County commissioner whose district includes Azle, said he warned his constituents when they sought an investigation.

"They're not going to say anything negative about the industry," Conley said. "That's their bread and butter. It's going to be very difficult for the Railroad Commission to say it's the oil and gas industry and shut those wells down."

The Railroad Commission is the oldest regulatory agency in Texas. It started handling aspects of the oil and gas industry in 1917, and its responsibilities include overseeing the state's roughly 7,500 disposal wells.

The agency is governed by three elected commissioners who serve six-year terms and raise most of their campaign money from the oil and gas industry. The commission is also known as a springboard to higher political office in the state.

## Long-established link

Geologists point to evidence going back decades that deep injection of industrial waste can lubricate faults and unleash earthquakes, whether that waste comes from oil and gas, carbon sequestration or making chemical weapons.

One of the earliest and most famous instances of man-made earthquakes, or "induced seismicity," occurred in the early 1960s at the Rocky Mountain Arsenal near Denver, where the Army injected waste from the manufacture of nerve agents.

Some earthquake researchers now say the nation's drilling boom, fueled by advances in high-volume hydraulic fracturing, could be spurring a rash of such man-made quakes, particularly in the middle of the country ([EnergyWire](#), March 29, 2012).

Damaging earthquakes have not been linked directly to the fracturing process. But drilling for oil and gas in shale, using hydraulic fracturing, creates millions of gallons of salty, toxic wastewater that is usually injected underground into deep wells.

In October, the U.S. Geological Survey warned that central Oklahoma is in the midst of an earthquake "swarm," potentially linked to injection.

Oklahoma, which has more than 4,500 disposal wells, ranked second for the number of earthquakes in the lower 48 states, after California, both this year and last year ([EnergyWire](#), Dec. 2).

Other states have shut down injection wells after earthquakes nearby. Ohio imposed a set of stricter new rules after a rash of quakes near Youngstown was linked to a disposal well in 2012.

Texas has some of the best-documented seismic activity around injection wells. Three injection wells in the Dallas area have been voluntarily shut down by the operator after earthquakes nearby. Researchers have linked injection to earthquakes in the Barnett Shale in north Texas and the Haynesville Shale in east Texas ([EnergyWire](#), Aug. 7, 2012).

Researchers at the University of Texas have also linked small, barely felt earthquakes to oil extraction in the Eagle Ford in south Texas. And they found that underground injection of carbon dioxide to boost oil production "may have contributed to triggering" a series of earthquakes north of Snyder several years ago.

In Oklahoma, state officials have dismissed findings by the U.S. Geological Survey and academic researchers that a damaging earthquake in November 2011 was linked to injection. The Oklahoma Geological Survey accepts that injection can cause quakes. But its scientists don't believe it was the reason for the damaging earthquakes in their state.

"Probably 100 percent of seismologists would agree that it can happen," said Cliff Frohlich, senior research scientist at the University of Texas' Institute for Geophysics.

But he said there's far less agreement on whether specific earthquakes are caused by injection. He compares it to smoking and lung cancer. It's accepted that smoking causes cancer but harder to say what caused cancer in a particular person. So it's much harder to say there's a "definitive" link to specific quakes in specific places.

## Open to more data

Still, Frohlich has established many of the links between earthquakes and injection wells in Texas. They include quakes near the Dallas-Fort Worth airport in 2009 that caused Chesapeake Energy Corp. to shutter two injection wells, and a magnitude-4.8 quake in May 2012, the largest ever recorded in east Texas.

He said he knows Railroad Commission staff are aware of his research because top staffers have attended his presentations. Commissioners, however, have not. After the airport quakes, he made a presentation to commission staff at their office.

"They know what's going on," Frohlich said. "The legitimate question is: What is the degree of hazard?"

Indeed, one of the top officials overseeing injection at the agency told a concerned resident that injection can cause earthquakes. In an email [obtained](#) by *StateImpact Texas* through an open records request, commission staffer Doug Johnson wrote that man-made earthquakes can occur "due to a number of different types of human activity, including subsurface fluid injection."

All three commissioners back the commission's statement on the lack of a "definitive" link between injection and earthquakes, Nye said.

Commissioner David Porter added, through a spokeswoman, that he is still open to more data on the topic.

"I am aware that there are studies and theories speculating on the correlation between injection and seismicity," Porter said in the emailed statement. "I, as well as my staff, are closely monitoring these studies and reviewing information as it becomes available. I welcome more information on this topic. In the meantime, the Railroad Commission will remain diligent in enforcing its current rules and regulations."

Around Azle, the earthquakes started with a magnitude-2.6 quake Nov. 6. They then rose in strength to a magnitude-3.6 on Nov. 20. They've been smaller since, except for another magnitude-3.6 quake Dec. 8 ([EnergyWire](#), Dec. 5).

Officials in Azle and Parker County have sent formal letters asking the Railroad Commission to investigate. But they say they haven't heard back.

"I haven't seen them," said Conley, the county commissioner. "I haven't heard from them."

A commission spokeswoman said inspectors visited one of the disposal wells in the area and found it in compliance with agency rules. But agency rules don't address earthquakes.

Seismologists say the first step in figuring out whether the earthquakes are man-made would be getting more accurate locations for the epicenters of the quakes. Seismologists at Southern Methodist University in Dallas have installed four seismic recorders from USGS in the area

